SHARP SERVICE MANUAL

PROGRAM WRITER

MODEL CE-165

Specifications

Composition:	8K byte EP-ROM x2, ICs, and others
Effective temperature range:	0°C through 40°C
Power consumption:	1.8W
Power source:	9V ⎓ (DC): Uses an exclusive AC adapter, EA-150
External dimensions:	455mm(W) x 267mm(D) x70mm(H)
Net weight:	4.4 kg
Accessories:	Dust Cover, AC Adapter (EA-150), Connection Cable, and the Instruction Manual

General Description and Precautions When Programming

1. Any program stored in the combined unit of PC-1500 and CE-155 can be written in the program module CE-160 (up to a maximum of 16 units) connected to a socket.

2. A reference function (hereinafter called "Verify") is provided, which checks to see if the contents stored in the socket-connected CE-160 (up to a maximum of 16 units) are properly maintained. Position to store the program, which is the reference source, can be selected either in the combined unit of PC-1500 and CE-155 or in the CE-160 contained in the socket No. 0 of the CE-165.

SHARP CORPORATION

3. Make sure that the BASIC program to be stored in the CE-160 be always prepared by the combined unit of PC-1500 and CE-155 and be recorded on a tape. Before using any program prepared by any other module such as CE-151, first save th program contents on a tape, and then load them onto a programmer set connected to CE-155.

4. CE-160 is capable of containing a variety of the BASIC programs having the following effective lengths.

   (1) Without CE-153 7,800 bytes

   (2) CE-153 being connected 6,733 bytes

   Capacity of the reserve area is 188 bytes, which is the same capacity as that being used by PC-1500 independently. When programming with the CE-155, make sure that the capacity of the variables used for programming is at a maximum of 2,047 bytes, except characters A through Z and A$ through Z$.

5. Make sure to write the contents of the reserve area before connecting the CE-165.

Outline of CE-165 functions
(See Instruction Manual for operational procedures.)

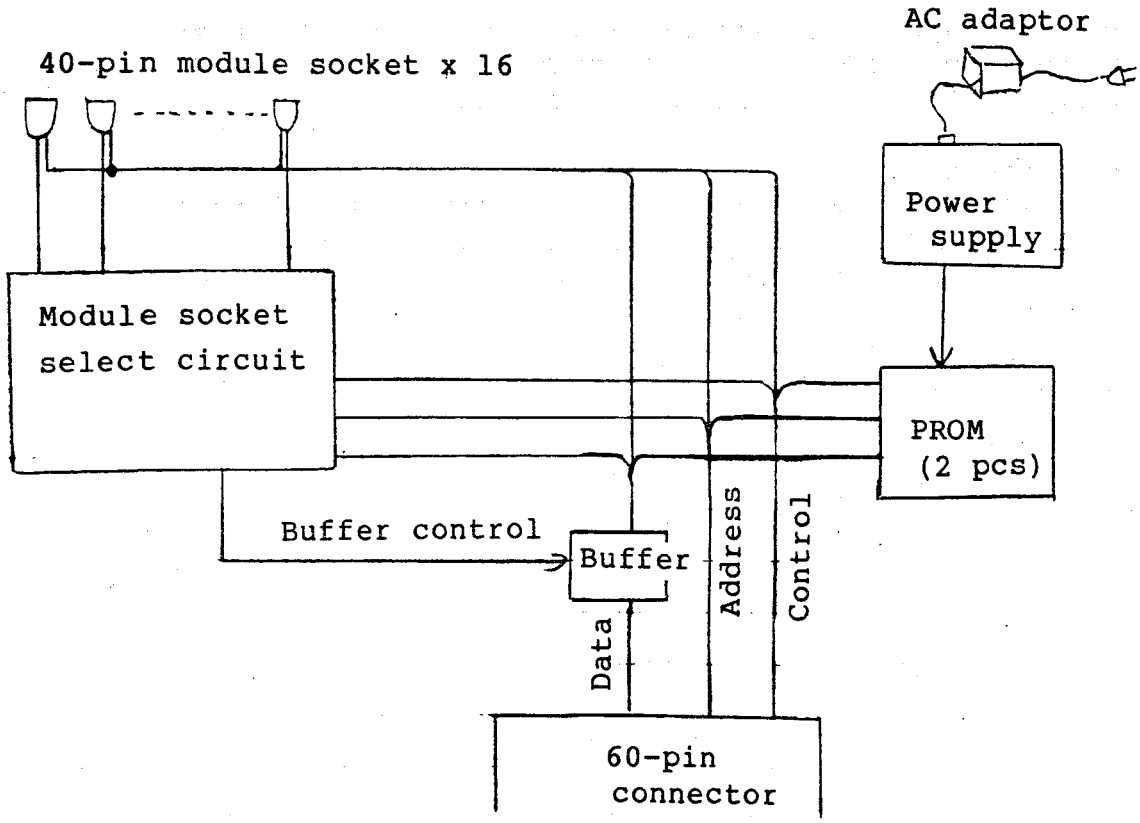
All functions are under the control of the PC-1500 CPU.
Program contents in address area, 3800H thru 57FFH (P C-1500 + CE-155), are transferred to the address area 0000 thru 1FFFH of the CE-165.
Transferred program can then be verified. Program transfer and verification are performed by the machine language and key entry and display controls are performed by BASIC.

Outline of power supply
Main power is supplied through the AC adaptor and DC 9V is supplied to the PROM by the switching op amp (CA3140). But, power to the PROM is not supplied when VCC=0V (PC-1500 at OFF). Power to other IC and LSI chips are supplied from the PC-1500. Supply voltage to the PROM must be adjusted to 4.7 ($\pm$0.1V) by means of the potentiometer of the power supply circuit.

Outline of signal circuits
TC40H243P: Data bus buffer
TC40H138P: Address decoder (by which PROM addressing and CE signals are generated)
TC40H139P: Mainly used to generate H243P control signals.

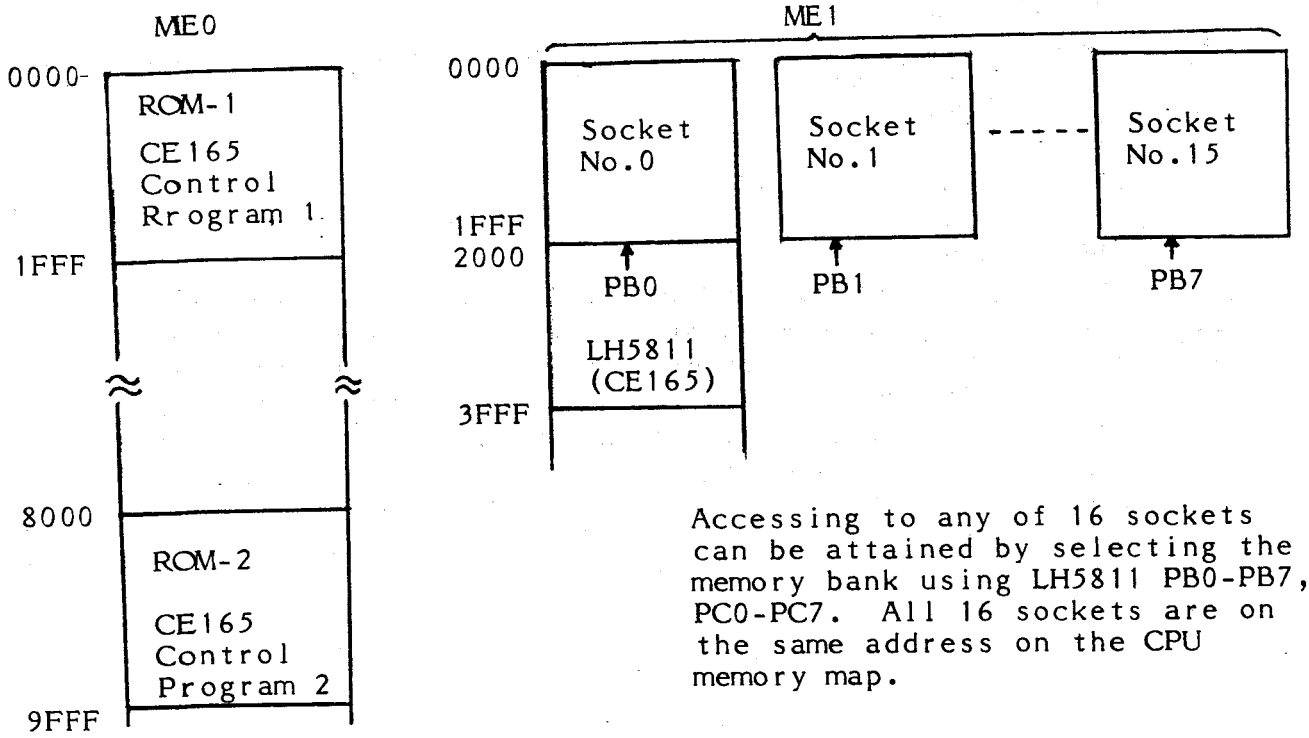
- Use the TI's 2564 for the PROM.
  Do not use 2764.
- Pay special attention for the position and mounting direction of two PROM's.
- Refer to the PC-1500 Service Manual and CE-160 Service Manual for signal functions of the 60-pin and 40-pin connectors.

CE-165 block diagram



Connected to the PC-1500 via cable

Address map when the CE-165 is in connection



Accessing to any of 16 sockets can be attained by selecting the memory bank using LH5811 PB0-PB7, PC0-PC7. All 16 sockets are on the same address on the CPU memory map.

NOTE: Different chip is used for the ROM-1 for export and domestic versions. The ROM-1 used for the export version is clearly marked for identification. But, the ROM-2 is used for both versions.

LH5811
This chip generates module socket select signal. During program write all 16 module sockets are selected at the same time, but one module socket will be selected at a time during verification.

LH5811 (CE-165) signal description

Pin No.	Signal name	In/ Out	Function
1	PA1	In/ Out	Not used.
⟨	⟨	⟨	⟨
7	PA7	In/ Out	Not used.
8	GND	In	GND
9	PB0	Out	Module socket No.0 enable from TC40H032.
10	PB1	Out	Module socket No.1 enable from TC40H032.
11	PB2	Out	Module socket No.2 enable from TC40H032.
12	PB3	Out	Module socket No.3 enable from TC40H032.
13	PB4	Out	Module socket No.4 enable from TC40H032.
14	PB5	Out	Module socket No.5 enable from TC40H032.
15	PB6	Out	Module socket No.6 enable from TC40H032.
16	PB7	Out	Module socket No.7 enable from TC40H032.
17	P0	In	Not used (GND).
18	PC0	Out	Module socket No.8 enable from TC40H032.
19	PC1	Out	Module socket No.9 enable from TC40H032.
20	PC2	Out	Module socket No.10 enable from TC40H032.
21	PC3	Out	Module socket No.11 enable from TC40H032.
22	PC4	Out	Module socket No.12 enable from TC40H032.
23	PC5	Out	Module socket No.13 enable from TC40H032.
24	PC6	Out	Module socket No.14 enable from TC40H032.
25	PC7	Out	Module socket No.15 enable from TC40H032.
26	CS0	In	VCC
27	$\overline{CS1}$	In	VCC
28	$\overline{CS2}$	In	Connected with #5 pin of the TC40H139 (chip enable signal for address, 2000-3FFF$_H$, on the memory.
29	RS0	In	AD0
⟨	⟨	⟨	⟨
32	RS3	In	AD3
33	R/W	In	R/W
34	ME0	In	ME1 (LH5811 is on the ME1 area).
35	ME1	In	Not used (GND).
36	W0	In	Not used.
37	W1	In	Not used.
38	GND	In	GND
39	VCC	In	VCC
40	DME0	Out	Not used.
41	DME1	Out	Not used.
42	WAIT	Out	Not used
43	INT	Out	Not used.
44	RESET	In	Initial reset signal
45	IRQ	In	Not used (GND).

Pin No.	Signal name	In/ Out	Function
46	ØOS	In	Clock (ØOS)
47	CL1	In/ Out	Not used (GND).
48	SD1	In/ Out	Not used (GND).
49	LC	Out	Not used.
50	CL0	Out	Not used.
51	SD0	In/ Out	Not used.
52	D0	In/ Out	Data bus
(	(	(	(
)	)	)	)
59	D7	In/ Out	Data bus
60	PA0	In/ Out	Not used.

TC40H243P

Truth table

Control input		Data port status			
$\overline{GAB}$	BGA	A		B	
L	L	INPUT	L	OUTPUT	L
			H		H
H	H	OUTPUT	L	INPUT	L
			H		H
L	H	Don't care			
H	L	High impedance			

$\overline{GAB}$ and GBA become low state when reading the address, 0000-3FFFH of the ME1 area and the buffer direction is from the CE-165 to the PC-1500. In otherwise condition, $\overline{GAB}$ and GBA are in high state and the buffer direction is from the PC-1500 to the CE-165.

TC40H138P

The TC40H138P(1) is the address decoder for the ME0 address area. High order three lines of the address are decoded to create eight lines of decode signals for each 8KB.
Of those decode signals, $\overline{Y0}$ (15 pin: 0000H-1FFFH) is used for the ROM-1 chip select ($\overline{CS2}$) and $\overline{Y4}$ (11 pin: 8000H-9FFFH) for the ROM-2 chip select signal.
On the other hand, the TC40H138P(2) functions as the address decoder for the ME1 area. High order three lines of the address are decoded to create eight lines of decode signals for each 8KB. Of those decode signals, $\overline{Y0}$ (15 pin: 0000H-1FFFH) is used for the module socket (16 chips) enable signal and $\overline{Y1}$ (14 pin: 2000H-3FFFH) for direction control of 243 through 008 and 139.

TC40H139P (decoder x 2)

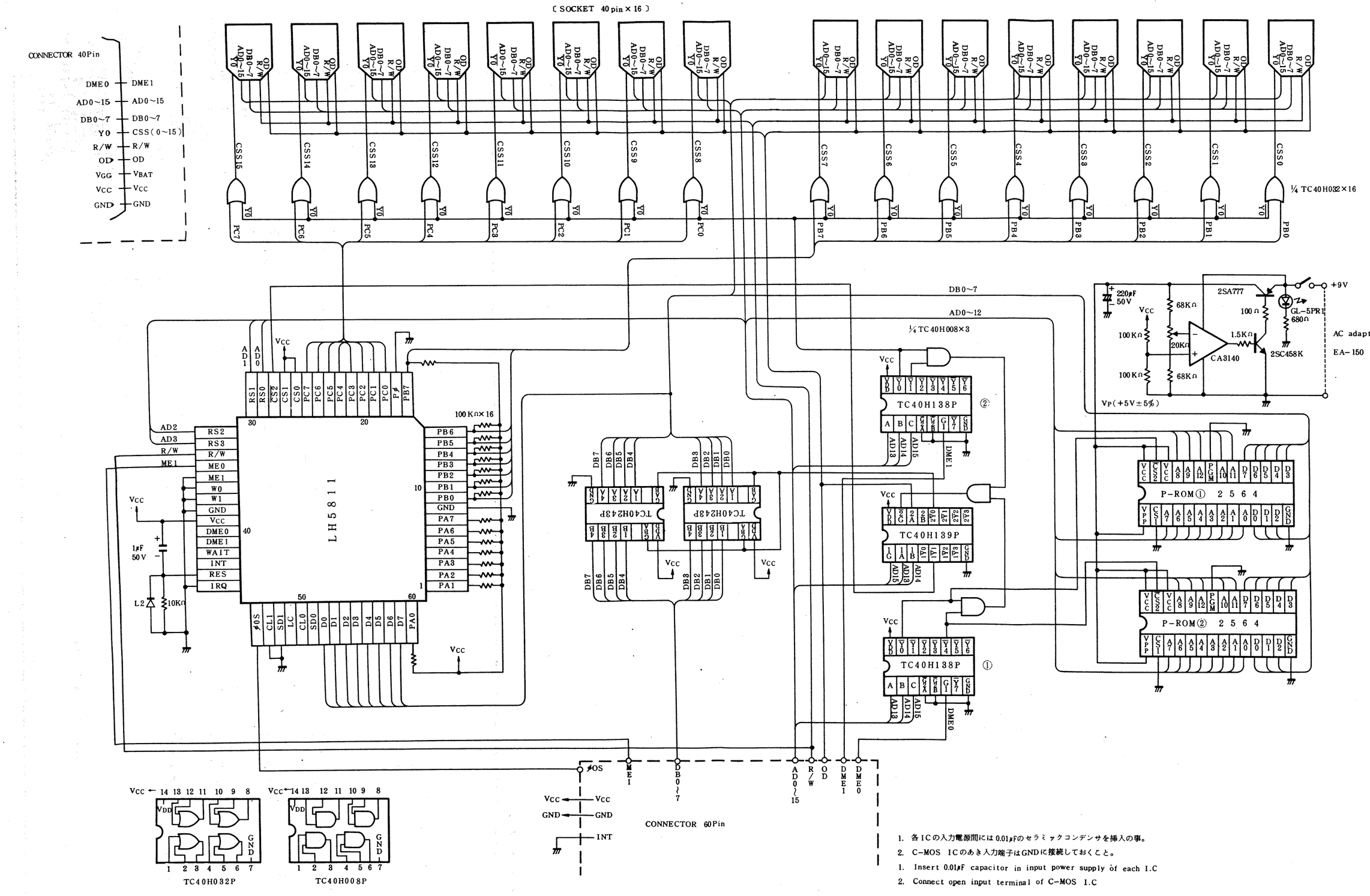
TC40H008P (AND gate)
One of decoders in the TC40H139 and is used for generating LH5811 chip select signal. The signal is generated when an address, 2000H-3FFFH, is accessed.
In combination of 008 and the other decoder of the TC40H139P, it perform control of 243 bus direction. For detail of signal generating conditions, refer to the 243 description.

TC40H032P x 4 (OR gate)
The module socket select signal is ANDed with the LH5811 output and adress decoder output (0000H-1FFFH of the ME1 area) to use it as a select signal for an individual module socket. The OR gate is used because of negative logic.

Module 40 pin socket
The signal R/W is connected to the pin nominally assigned to GND (adjacent to AD15) and the output from 032 is connected to the pin Y0. (Module socket select signal). There are no changes except the above.

Power supply circuit
The op amp (CA3140) is used as a comparator to compare the PROM supply voltage with VCC. As it is fed back to the switching circuit consisting of transistors (A671, C458) to repeat on and off (op amp output high and low) so that the PROM supply voltage should match with VCC.
When VCC is low (PC-1500 at off), the PROM supply voltage becomes 0V.
The electrolytic capacitor is used to smooth the PROM supply power.

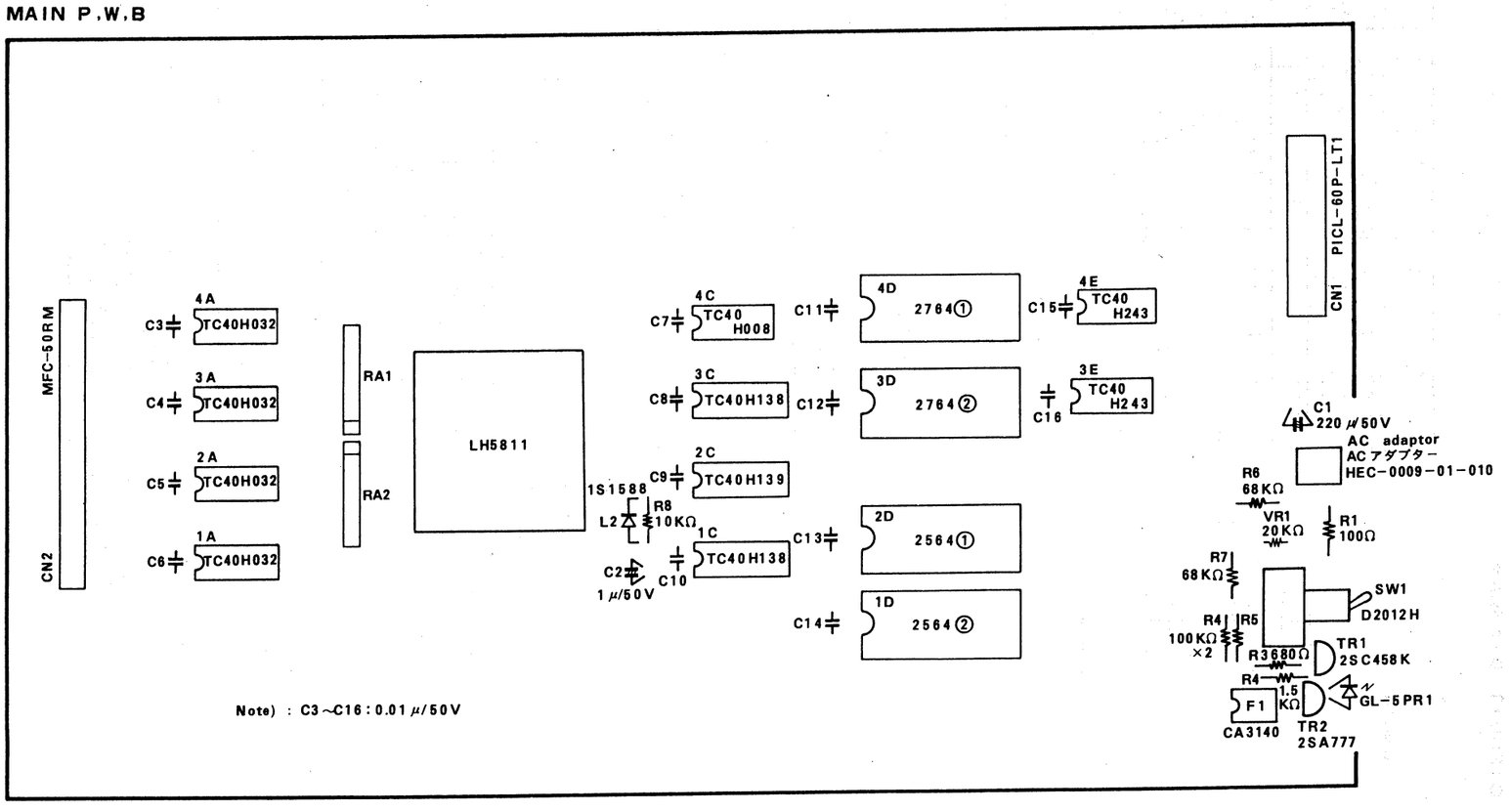
CIRCUIT DIAGRAM



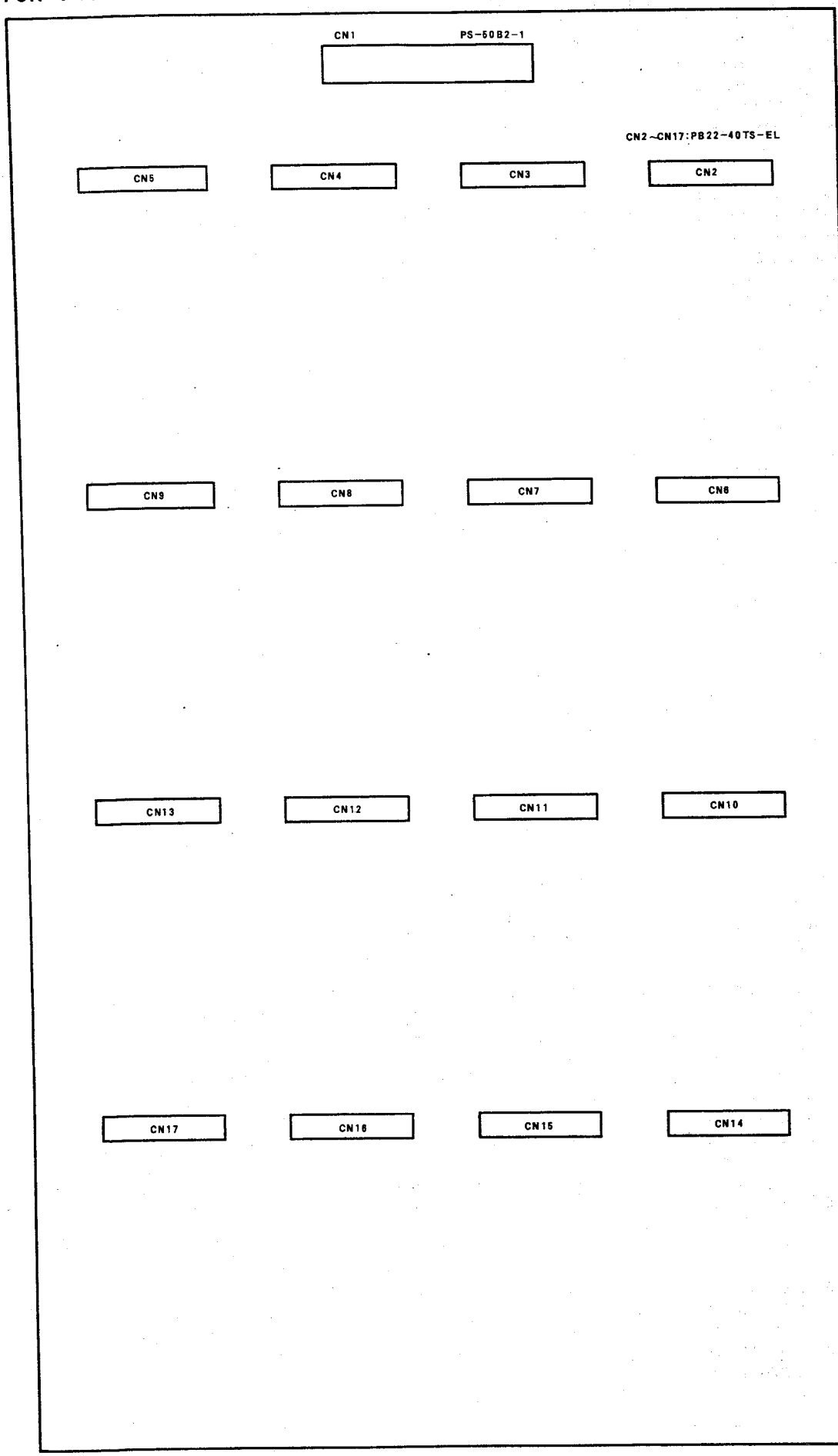
1. 各ICの入力電源間には0.01μFのセラミックコンデンサを挿入の事。
2. C-MOS ICのあき入力端子はGNDに接続しておくこと。

1. Insert 0.01μF capacitor in input power supply of each I.C
2. Connect open input terminal of C-MOS I.C

MAIN P.W.B

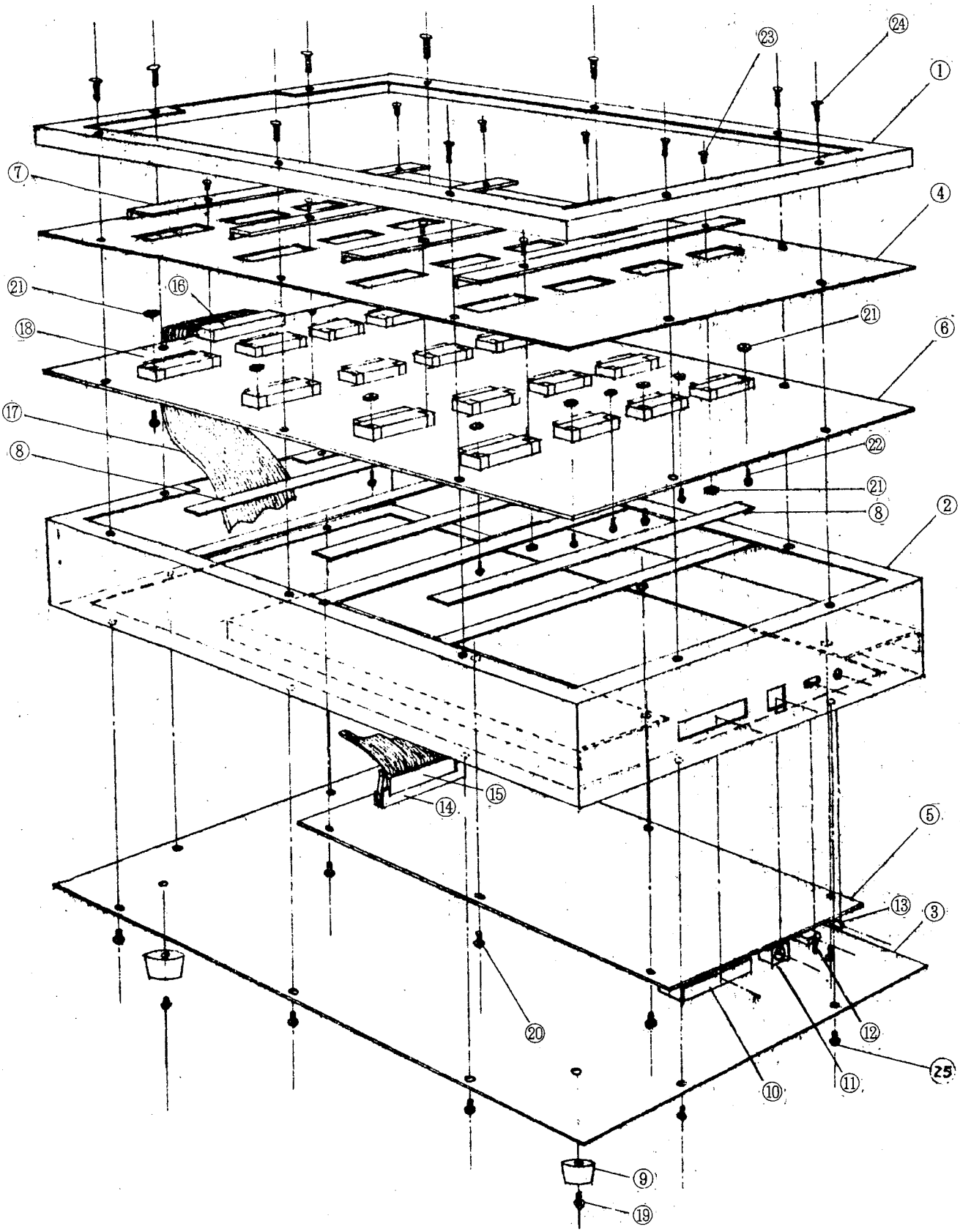

MFC-50RM
CN2
4A
C3
TC40H032
3A
C4
TC40H032
2A
C5
TC40H032
1A
C6
TC40H032
RA1
RA2
LH5811
4C
C7
TC40 H008
3C
C8
TC40H138
2C
C9
TC40H139
1S1588
L2
R8
10KΩ
C2
1μ/50V
1C
C10
TC40H138
4D
C11
2764①
3D
C12
2764②
2D
C13
2564①
1D
C14
2564②
4E
C15
TC40 H243
3E
C16
TC40 H243
CN1 PICL-60P-LT1
C1
220μ/50V
AC adaptor
ACアダプター
HEC-0009-01-010
R6
68KΩ
VR1
20KΩ
R1
100Ω
R7
68KΩ
SW1
D2012H
R4
100KΩ
×2
R5
R3
680Ω
TR1
2SC458K
R4
1.5
KΩ
F1
CA3140
TR2
2SA777
GL-5PR1
Note) : C3~C16 : 0.01μ/50V

CONNECTOR P.W.B



CE-165 PARTS LIST & GUIDE

NO.	PARTS CODE	PRICE RANK Ja.	PRICE RANK Ex.	DESCRIPTION	
1	OCDCABCE16501	L T	B N	本体カバー	Body cover
2	OCDCABCE16502	T J	B X	本体ケース	Body case
3	OCDCABCE16503	H T	B H	底板	Bottom plate
4	OCDSEETCE165Z	L B	B L	絶縁シート	Insulator
5	————				
6	————				
7	OCDCNCABCE165	F G	A T	コネクターカバー	Connector cover
8	OCDBBERCE165Z	D N	A F	絶縁板	Insulation plate
9	OCDRBK7WL7027	D K	A E	ゴム足（ワッシャー付き）	Rubber foot (with washer)
10	QCNCM1295CC6J	F P	A V	コネクター（PiCL-60P-LT1）	Connector (PiCL-60P-LT1)
11	QJAKC1003CCZZ	D H	A D	アダプタージャック	Adaptor jack
12	OCDSWND-2012H	F N	A V	スナップスイッチ	Snap switch
13	VHPGL5PR1//-1	D D	A C	L. E. D.	L. E. D.
14	OCDCNHMFC50RM	G A	A Y	コネクター（MFC50RM）	Connector (MFC50RM)
15	OCDCNHMFC50RF	G C	A Z	コネクター（MFC50RF）	Connector (MFC50RF)
16	OCDCNPS50B2-1	G G	B A	コネクター（PS-50B2-1）	Connector (PS-50B2-1)
17	OCDFCABLB50SZ	F W	A X	F. P. C. (50pin)	F. P. C. (50pin)
18	QCNCW1294CCZZ	F V	A X	コネクター（PB22-40TS-E1）	Connector (PB22-40TS-E1)
19	XBPSD30P08000	D A	A A	ビス	Screw
20	XBPSD30P06000	D A	A A	ビス	Screw
21	XNESD20-16000	D A	A A	ナット	Nut
22	XBPSD20P10000	D A	A A	ビス	Screw
23	XBPSD20P15000	D A	A A	ビス	Screw
24	XBTSF30P10000	D A	A A	ビス	Screw
25	XBTSF30P06000	D A	A A	ビス	Screw
	PSPAP1207CCZZ	D B	A A	スペーサー	Spacer
	QCNCW1293CCZZ	F Y	A Y	コネクター（PiCL-60S-LT）	Connector (PiCL-60S-LT)
	XWHSD20-04060	D A	A A	ワッシャー	Washer
	GCOVD1370CCZZ	E X	A R	ダストカバー	Dust cover
	OCDPAKCE16504	H R	B H	パッキングケース	Packing case
	OCDPWBFX1500W	T A	B W	接続ケーブル	Connection cable
	DUNT-6451CC03	Z Z	✕	ACアダプター EA150（日本）	AC adaptor EA150 (Japan)
	QSOCZ1020CCZZ	N U	B T	CPUソケット	CPU socket
	VS2SC458///-1	D L	A C	トランジスタ	Transistor
	VS2SA777///-1	D Q	A G	トランジスタ	Transistor
	VHiTC40H138P1	E M	A N	i. C.	i. C.
	VHiTC40H139-1	E S	A Q	i. C.	i. C.
	VHiLH5811//-1	G D	A Z	i. C.	i. C.
	VHiTC40H008PN	D Q	A E	i. C.	i. C.
	VHiTC40H032-1	D Q	A F	i. C.	i. C.
	OCDiCRCA3140E	E K	A N	i. C. (CA3140E)	i. C. (CA3140E)
	OCDSiCC842802	E E	A M	i. C. ソケット（28pin）	i. C. socket (28pin)
	OCDSiCC841602	D V	A H	i. C. ソケット（16pin）	i. C. socket (16pin)
	OCDSiCC841402	D T	A G	i. C. ソケット（14pin）	i. C. socket (14pin)
	OCDSiCC840802	D S	A G	i. C. ソケット（8pin）	i. C. socket (8pin)
	OCDVRRJ-6P203	F E	A S	VR 20KΩ	VR 20Kohm
	OCDiTMS2564IA	M E	B P	P-ROM①（日本）	P-ROM (Japan)
	OCDiTMS2564IB	M E	B P	P-ROM①（海外）	P-ROM (Ex)
	OCDiTMS25642Z	M E	B P	P-MOM②	P-MOM
	VCKYPU1HB103K	D B	A A	コンデンサ 50V 0.01μF	Capacitor 50V 0.01μF
	RMPTC8104QCKB	D L	A D	ブロック抵抗 100KΩ（8素子）	Block resistor 100Kohm (8 elements)
	VRD-ST2EY101J	D A	A A	抵抗 1/4W 100Ω ±5%	Resistor 1/4W 100ohm ±5%
	VRD-ST2EY681J	D A	A A	抵抗 1/4W 680Ω ±5%	Resistor 1/4W 680ohm ±5%
	VRD-ST2EY152J	D A	A A	抵抗 1/4W 1.5KΩ ±5%	Resistor 1/4W 1.5Kohm ±5%
	VRD-ST2EY103J	D A	A A	抵抗 1/4W 10KΩ ±5%	Resistor 1/4W 10Kohm ±5%
	VRD-ST2EY683J	D B	A A	抵抗 1/4W 68KΩ ±5%	Resistor 1/4W 68Kohm ±5%
	VRD-ST2EY104J	D A	A A	抵抗 1/4W 100KΩ ±5%	Resistor 1/4W 100Kohm ±5%
	VCEAAU1HW105Q	D B	A B	コンデンサ 50V 1μF	Capacitor 50V 1μF
	VCEAAU1HW227Q	D H	A E	コンデンサ 50V 220μF	Capacitor 50V 220μF
	VHD1S1588L2-1	D B	A B	ダイオード	Diode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